

SEQUENCE LISTING

<110> Mahajan, Pramod B.

<120> RuvB Polynucleotides and Uses Thereof

<130> 1121C

<150> US 60/144,112

<151> 1999-07-16

<150> US 09/589,510

<151> 2000-06-07

<160> 11

<170> FastSEQ for Windows Version 4.0

<210> 1

<211> 1845

<212> DNA

<213> Zea mays

<220>

<221> CDS

<222> (85)...(1449)

<400> 1

```

gacccacgcg tccgccatcc cccgccccca aattttggca gctccacaga aacagagagc      60
gcataaccgg cggtgttggc ggcg atg agg atc gag gag gtg cag tcg acc      111
                               Met Arg Ile Glu Glu Val Gln Ser Thr
                               1               5

tcg aag aag cag cgc atc gcc acc cac acc cac atc aag gga ctc ggc      159
Ser Lys Lys Gln Arg Ile Ala Thr His Thr His Ile Lys Gly Leu Gly
  10               15               20               25

ctc gac gcc aat ggg atg gcg att gcg ttg gcg gcg ggg ttc gtg ggc      207
Leu Asp Ala Asn Gly Met Ala Ile Ala Leu Ala Ala Gly Phe Val Gly
               30               35               40

cag tcg gcg gcg cgc gag gcg gcc ggg ctg gcg gtc gac atg att cgc      255
Gln Ser Ala Ala Arg Glu Ala Ala Gly Leu Ala Val Asp Met Ile Arg
               45               50               55

cag aaa aag atg gcc ggc cgc gcg gtg ctc ctt gtg ggt ccg ccc gcc      303
Gln Lys Lys Met Ala Gly Arg Ala Val Leu Leu Val Gly Pro Pro Ala
               60               65               70

acg ggc aag acg gcg cta gcg ctc ggc ata gcc cag gag ctc ggc agc      351
Thr Gly Lys Thr Ala Leu Ala Leu Gly Ile Ala Gln Glu Leu Gly Ser
               75               80               85

aag gtc cct ttc tgc cct atg gta gga tca gaa gtg tac tcc tcg gag      399

```

| | | | | | | | | | | | | | | | | |
|-----------|-----|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------|
| Lys 90 | Val | Pro | Phe | Cys | Pro 95 | Met | Val | Gly | Ser | Glu 100 | Val | Tyr | Ser | Ser | Glu 105 | |
| gtc | aag | aaa | act | gag | gtg | ctg | atg | gaa | aat | ttc | cgt | aga | gct | ata | ggc | 447 |
| Val | Lys | Lys | Thr | Glu 110 | Val | Leu | Met | Glu | Asn 115 | Phe | Arg | Arg | Ala | Ile | Gly 120 | |
| ttg | cgt | ata | aag | gaa | aac | aaa | gag | gtt | tat | gaa | gga | gag | gtt | act | gaa | 495 |
| Leu | Arg | Ile | Lys 125 | Glu | Asn | Lys | Glu | Val 130 | Tyr | Glu | Gly | Glu | Val 135 | Thr | Glu | |
| ctt | tcc | cca | gaa | gag | gct | gag | agt | aca | act | ggc | gga | tat | gca | aaa | agc | 543 |
| Leu | Ser | Pro 140 | Glu | Glu | Ala | Glu | Ser 145 | Thr | Thr | Gly | Gly | Tyr 150 | Ala | Lys | Ser | |
| att | agc | cat | gta | atc | atc | agc | tta | aag | act | gtt | aaa | ggg | act | aag | caa | 591 |
| Ile | Ser | His | Val | Ile | Ile | Ser 160 | Leu | Lys | Thr | Val | Lys 165 | Gly | Thr | Lys | Gln | |
| ctg | aag | tta | gat | tct | tca | att | tat | gat | gct | ctg | atc | aag | gaa | aag | gtg | 639 |
| Leu | Lys | Leu | Asp | Ser 175 | Ser | Ile | Tyr | Asp | Ala | Leu 180 | Ile | Lys | Glu | Lys | Val 185 | |
| gca | gtg | ggc | gat | gtt | ata | tac | att | gaa | gca | aat | agt | gga | gca | gtg | aaa | 687 |
| Ala | Val | Gly | Asp 190 | Val | Ile | Tyr | Ile | Glu | Ala 195 | Asn | Ser | Gly | Ala | Val 200 | Lys | |
| aga | gtt | ggc | aga | tgt | gat | tct | ttt | gct | aca | gaa | tac | gat | ctt | gaa | gct | 735 |
| Arg | Val | Gly | Arg 205 | Cys | Asp | Ser | Phe | Ala 210 | Thr | Glu | Tyr | Asp | Leu 215 | Glu | Ala | |
| gaa | gaa | tat | gtt | cct | atc | ccc | aaa | ggc | gaa | gtc | cat | aag | aaa | aaa | gaa | 783 |
| Glu | Glu | Tyr 220 | Val | Pro | Ile | Pro | Lys 225 | Gly | Glu | Val | His | Lys 230 | Lys | Lys | Glu | |
| ata | gtg | cag | gat | gtc | aca | ctt | cat | gac | ctt | gat | gca | gca | aat | gct | cag | 831 |
| Ile | Val | Gln | Asp 235 | Val | Thr | Leu | His 240 | Asp | Leu | Asp | Ala | Ala | Asn | Ala | Gln | |
| cca | caa | ggc | ggc | caa | gat | att | ttg | tcc | ctt | atg | ggc | cag | atg | atg | aaa | 879 |
| Pro | Gln | Gly | Gly | Gln | Asp 255 | Ile | Leu | Ser | Leu 260 | Met | Gly | Gln | Met | Met | Lys 265 | |
| cca | cga | aag | act | gaa | atc | acc | gaa | aaa | cta | cgc | caa | gaa | att | aat | aag | 927 |
| Pro | Arg | Lys | Thr 270 | Glu | Ile | Thr | Glu | Lys 275 | Leu | Arg | Gln | Glu | Ile | Asn 280 | Lys | |
| gtg | gta | aat | aga | tat | atc | gat | gaa | gga | att | gca | gag | ctt | gta | cct | ggc | 975 |
| Val | Val | Asn 285 | Arg | Tyr | Ile | Asp | Glu | Gly 290 | Ile | Ala | Glu | Leu 295 | Val | Pro | Gly | |
| gtt | tta | ttc | att | gac | gag | gtc | cac | atg | ttg | gat | atc | gaa | tgt | ttt | tct | 1023 |
| Val | Leu | Phe 300 | Ile | Asp | Glu | Val | His 305 | Met | Leu | Asp | Ile | Glu 310 | Cys | Phe | Ser | |
| tat | ctt | aac | cgt | gca | ttg | gag | agc | cca | tta | tca | cca | att | gtg | ata | ctt | 1071 |

| | | | | | | | | | | | | | | | | |
|-------------|------------|------------|------------|------------|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| Tyr | Leu | Asn | Arg | Ala | Leu | Glu | Ser | Pro | Leu | Ser | Pro | Ile | Val | Ile | Leu | |
| 315 | | | | | | 320 | | | | | 325 | | | | | |
| gct | acg | aat | agg | gga | ata | tgt | aat | gta | aga | gga | act | gat | atg | aca | agt | 1119 |
| Ala | Thr | Asn | Arg | Gly | Ile | Cys | Asn | Val | Arg | Gly | Thr | Asp | Met | Thr | Ser | |
| 330 | | | | | 335 | | | | | 340 | | | | | 345 | |
| cca | cat | ggt | ata | cca | gtg | gat | ctt | cta | gat | agg | ttg | gtg | att | att | cgg | 1167 |
| Pro | His | Gly | Ile | Pro | Val | Asp | Leu | Leu | Asp | Arg | Leu | Val | Ile | Ile | Arg | |
| | | | | 350 | | | | | 355 | | | | | 360 | | |
| aca | gag | aca | tat | ggc | cct | act | gag | atg | ata | cag | ata | ttg | gct | atc | cga | 1215 |
| Thr | Glu | Thr | Tyr | Gly | Pro | Thr | Glu | Met | Ile | Gln | Ile | Leu | Ala | Ile | Arg | |
| | | | 365 | | | | | 370 | | | | | 375 | | | |
| gca | caa | gtg | gag | gac | att | gat | atg | gat | gaa | gaa | agt | ctt | gct | tat | tta | 1263 |
| Ala | Gln | Val | Glu | Asp | Ile | Asp | Met | Asp | Glu | Glu | Ser | Leu | Ala | Tyr | Leu | |
| | | 380 | | | | | 385 | | | | | 390 | | | | |
| ggc | gag | atc | gga | cag | cag | aca | tct | tta | aga | cat | gct | att | caa | ttg | ata | 1311 |
| Gly | Glu | Ile | Gly | Gln | Gln | Thr | Ser | Leu | Arg | His | Ala | Ile | Gln | Leu | Ile | |
| | 395 | | | | | 400 | | | | | 405 | | | | | |
| tca | cct | gcc | agc | gtg | gtc | tca | aag | act | aat | gga | aga | gag | aaa | ata | tgc | 1359 |
| Ser | Pro | Ala | Ser | Val | Val | Ser | Lys | Thr | Asn | Gly | Arg | Glu | Lys | Ile | Cys | |
| 410 | | | | | 415 | | | | | 420 | | | | | 425 | |
| aag | gct | gat | ctc | gag | gaa | gtc | agt | ggg | ctc | tat | ttg | gat | gcc | aaa | tcc | 1407 |
| Lys | Ala | Asp | Leu | Glu | Glu | Val | Ser | Gly | Leu | Tyr | Leu | Asp | Ala | Lys | Ser | |
| | | | | 430 | | | | | 435 | | | | | 440 | | |
| tcg | gct | cgg | ctg | ctc | cag | gag | caa | caa | gaa | aga | tac | atc | acc | | | 1449 |
| Ser | Ala | Arg | Leu | Leu | Gln | Glu | Gln | Gln | Glu | Arg | Tyr | Ile | Thr | | | |
| | | | 445 | | | | | 450 | | | | | 455 | | | |
| tagatttggga | tcacctgtcg | tggaagtctc | gaagagaatg | tagttgccag | ctcgaaagtc | | | | | | | | | | | 1509 |
| atctagtga | ttgatctgct | tcacaggtct | tgagcgagc | acatttcggg | ggggacggct | | | | | | | | | | | 1569 |
| tgaattttgc | agtgcctgct | tgtgttagtc | tccagagaag | acttggtacc | ggcatattgc | | | | | | | | | | | 1629 |
| ctgttcacgc | actgttcgct | gattagattg | gtcacccgtg | caggaattgc | cgtgtgtgtt | | | | | | | | | | | 1689 |
| ttttatcttg | ctcatcggtg | tccggaatct | gtgcctccac | gggttgatt | ggcccgaacc | | | | | | | | | | | 1749 |
| ctatctttgt | aaccatggat | aatggatagc | attcttacag | aatgcaactt | gcatggcttt | | | | | | | | | | | 1809 |
| wttwaaaaaa | aaaaaaaaaa | aaaaaaaaaa | aaaaaa | | | | | | | | | | | | | 1845 |

<210> 2
 <211> 455
 <212> PRT
 <213> Zea mays

<400> 2
 Met Arg Ile Glu Glu Val Gln Ser Thr Ser Lys Lys Gln Arg Ile Ala
 1 5 10 15
 Thr His Thr His Ile Lys Gly Leu Gly Leu Asp Ala Asn Gly Met Ala
 20 25 30
 Ile Ala Leu Ala Ala Gly Phe Val Gly Gln Ser Ala Ala Arg Glu Ala
 35 40 45
 Ala Gly Leu Ala Val Asp Met Ile Arg Gln Lys Lys Met Ala Gly Arg

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
| 50 | | | | | | 55 | | | | | 60 | | | | | |
| Ala | Val | Leu | Leu | Val | Gly | Pro | Pro | Ala | Thr | Gly | Lys | Thr | Ala | Leu | Ala | |
| 65 | | | | | 70 | | | | | 75 | | | | | 80 | |
| Leu | Gly | Ile | Ala | Gln | Glu | Leu | Gly | Ser | Lys | Val | Pro | Phe | Cys | Pro | Met | |
| | | | | 85 | | | | | 90 | | | | | 95 | | |
| Val | Gly | Ser | Glu | Val | Tyr | Ser | Ser | Glu | Val | Lys | Lys | Thr | Glu | Val | Leu | |
| | | | 100 | | | | | 105 | | | | | 110 | | | |
| Met | Glu | Asn | Phe | Arg | Arg | Ala | Ile | Gly | Leu | Arg | Ile | Lys | Glu | Asn | Lys | |
| | | 115 | | | | | 120 | | | | | 125 | | | | |
| Glu | Val | Tyr | Glu | Gly | Glu | Val | Thr | Glu | Leu | Ser | Pro | Glu | Glu | Ala | Glu | |
| | 130 | | | | | 135 | | | | | 140 | | | | | |
| Ser | Thr | Thr | Gly | Gly | Tyr | Ala | Lys | Ser | Ile | Ser | His | Val | Ile | Ile | Ser | |
| 145 | | | | | 150 | | | | | 155 | | | | | 160 | |
| Leu | Lys | Thr | Val | Lys | Gly | Thr | Lys | Gln | Leu | Lys | Leu | Asp | Ser | Ser | Ile | |
| | | | | 165 | | | | | 170 | | | | | 175 | | |
| Tyr | Asp | Ala | Leu | Ile | Lys | Glu | Lys | Val | Ala | Val | Gly | Asp | Val | Ile | Tyr | |
| | | 180 | | | | | | 185 | | | | 190 | | | | |
| Ile | Glu | Ala | Asn | Ser | Gly | Ala | Val | Lys | Arg | Val | Gly | Arg | Cys | Asp | Ser | |
| | | 195 | | | | | 200 | | | | | 205 | | | | |
| Phe | Ala | Thr | Glu | Tyr | Asp | Leu | Glu | Ala | Glu | Glu | Tyr | Val | Pro | Ile | Pro | |
| | 210 | | | | | 215 | | | | | 220 | | | | | |
| Lys | Gly | Glu | Val | His | Lys | Lys | Lys | Glu | Ile | Val | Gln | Asp | Val | Thr | Leu | |
| 225 | | | | | 230 | | | | | 235 | | | | | 240 | |
| His | Asp | Leu | Asp | Ala | Ala | Asn | Ala | Gln | Pro | Gln | Gly | Gly | Gln | Asp | Ile | |
| | | | | 245 | | | | 250 | | | | | | 255 | | |
| Leu | Ser | Leu | Met | Gly | Gln | Met | Met | Lys | Pro | Arg | Lys | Thr | Glu | Ile | Thr | |
| | | | 260 | | | | | 265 | | | | | 270 | | | |
| Glu | Lys | Leu | Arg | Gln | Glu | Ile | Asn | Lys | Val | Val | Asn | Arg | Tyr | Ile | Asp | |
| | | 275 | | | | | 280 | | | | | 285 | | | | |
| Glu | Gly | Ile | Ala | Glu | Leu | Val | Pro | Gly | Val | Leu | Phe | Ile | Asp | Glu | Val | |
| | 290 | | | | | 295 | | | | | 300 | | | | | |
| His | Met | Leu | Asp | Ile | Glu | Cys | Phe | Ser | Tyr | Leu | Asn | Arg | Ala | Leu | Glu | |
| 305 | | | | | 310 | | | | | 315 | | | | | 320 | |
| Ser | Pro | Leu | Ser | Pro | Ile | Val | Ile | Leu | Ala | Thr | Asn | Arg | Gly | Ile | Cys | |
| | | | | 325 | | | | | 330 | | | | | 335 | | |
| Asn | Val | Arg | Gly | Thr | Asp | Met | Thr | Ser | Pro | His | Gly | Ile | Pro | Val | Asp | |
| | | | 340 | | | | | 345 | | | | | 350 | | | |
| Leu | Leu | Asp | Arg | Leu | Val | Ile | Ile | Arg | Thr | Glu | Thr | Tyr | Gly | Pro | Thr | |
| | | 355 | | | | | 360 | | | | | 365 | | | | |
| Glu | Met | Ile | Gln | Ile | Leu | Ala | Ile | Arg | Ala | Gln | Val | Glu | Asp | Ile | Asp | |
| | 370 | | | | | 375 | | | | | 380 | | | | | |
| Met | Asp | Glu | Glu | Ser | Leu | Ala | Tyr | Leu | Gly | Glu | Ile | Gly | Gln | Gln | Thr | |
| 385 | | | | | 390 | | | | | 395 | | | | | 400 | |
| Ser | Leu | Arg | His | Ala | Ile | Gln | Leu | Ile | Ser | Pro | Ala | Ser | Val | Val | Ser | |
| | | | | 405 | | | | | 410 | | | | | 415 | | |
| Lys | Thr | Asn | Gly | Arg | Glu | Lys | Ile | Cys | Lys | Ala | Asp | Leu | Glu | Glu | Val | |
| | | | 420 | | | | | 425 | | | | | 430 | | | |
| Ser | Gly | Leu | Tyr | Leu | Asp | Ala | Lys | Ser | Ser | Ala | Arg | Leu | Leu | Gln | Glu | |
| | | 435 | | | | | 440 | | | | | 445 | | | | |
| Gln | Gln | Glu | Arg | Tyr | Ile | Thr | | | | | | | | | | |
| | 450 | | | | | 455 | | | | | | | | | | |

<210> 3
 <211> 1912
 <212> DNA
 <213> Zea mays

<220>
 <221> CDS
 <222> (94)...(1458)

```

<400> 3
accacgcgt ccgcaaattt gttgcggcgg gagagccgga gaggaggcag ctccacagaa      60
acagagagcg cataaccggc ggcgttggcg gcg atg agg atc gag gag gtg cag      114
                               Met Arg Ile Glu Glu Val Gln
                               1                               5

tcg acc tcg aag aag cag cgc atc gcc acc cac acc cac atc aag gga      162
Ser Thr Ser Lys Lys Gln Arg Ile Ala Thr His Thr His Ile Lys Gly
          10                               15                               20

ctc ggc ctc gac gcc aat ggg atg gcg att gcg ttg gcg gcg ggg ttc      210
Leu Gly Leu Asp Ala Asn Gly Met Ala Ile Ala Leu Ala Ala Gly Phe
          25                               30                               35

gtg ggc cag gcg gcg gcg cgc gag gcg gcc ggg ctg gcg gtc gac atg      258
Val Gly Gln Ala Ala Ala Arg Glu Ala Ala Gly Leu Ala Val Asp Met
          40                               45                               50                               55

att cgc cag aag aag atg gcc ggc cgc gcg gtg ctc ctt gcg ggt ccg      306
Ile Arg Gln Lys Lys Met Ala Gly Arg Ala Val Leu Leu Ala Gly Pro
                               60                               65                               70

ccc gcc acg ggc aag acg gcg cta gcg ctc ggc ata gcc cag gag ctc      354
Pro Ala Thr Gly Lys Thr Ala Leu Ala Leu Gly Ile Ala Gln Glu Leu
                               75                               80                               85

ggc agc aag gtc cct ttc tgt cct atg gta gga tca gaa gtg tac tcc      402
Gly Ser Lys Val Pro Phe Cys Pro Met Val Gly Ser Glu Val Tyr Ser
          90                               95                               100

tcg gag gtc aag aaa act gag gtg ctg atg gaa aat ttc cgt aga gct      450
Ser Glu Val Lys Lys Thr Glu Val Leu Met Glu Asn Phe Arg Arg Ala
          105                               110                               115

ata ggt ttg cgt ata aag gaa aac aaa gag gtt tat gaa gga gag gtt      498
Ile Gly Leu Arg Ile Lys Glu Asn Lys Glu Val Tyr Glu Gly Glu Val
          120                               125                               130                               135

act gaa ctt tcc cca gaa gag gct gag agt aca act ggt gga tat gca      546
Thr Glu Leu Ser Pro Glu Glu Ala Glu Ser Thr Thr Gly Gly Tyr Ala
                               140                               145                               150

aaa agc att agc cat gta atc atc agc tta aag act gtt aaa ggg act      594
Lys Ser Ile Ser His Val Ile Ile Ser Leu Lys Thr Val Lys Gly Thr
                               155                               160                               165

aag caa ctg aag tta gat tct tca att tat gat gct ctg atc aag gaa      642
Lys Gln Leu Lys Leu Asp Ser Ser Ile Tyr Asp Ala Leu Ile Lys Glu
          170                               175                               180

aag gtg gca gtg ggt gat gtt ata tac atc gaa gca aat agt gga gca      690

```

| | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|--|
| Lys | Val | Ala | Val | Gly | Asp | Val | Ile | Tyr | Ile | Glu | Ala | Asn | Ser | Gly | Ala | | |
| 185 | | | | | | 190 | | | | | 195 | | | | | | |
| gtg | aaa | aga | gtt | ggt | aga | tgt | gat | tct | ttt | gct | aca | gaa | tac | gat | ctt | 738 | |
| Val | Lys | Arg | Val | Gly | Arg | Cys | Asp | Ser | Phe | Ala | Thr | Glu | Tyr | Asp | Leu | | |
| 200 | | | | | 205 | | | | | 210 | | | | | 215 | | |
| gaa | gct | gaa | gag | tat | gtt | cct | atc | ccc | aaa | ggt | gaa | gtc | cat | aag | aaa | 786 | |
| Glu | Ala | Glu | Glu | Tyr | Val | Pro | Ile | Pro | Lys | Gly | Glu | Val | His | Lys | Lys | | |
| | | | | 220 | | | | | 225 | | | | | 230 | | | |
| aaa | gaa | att | gtg | cag | gat | gtc | aca | ctt | cat | gac | ctt | gat | gca | gca | aat | 834 | |
| Lys | Glu | Ile | Val | Gln | Asp | Val | Thr | Leu | His | Asp | Leu | Asp | Ala | Ala | Asn | | |
| | | | 235 | | | | | 240 | | | | | 245 | | | | |
| gct | cag | cca | caa | ggt | ggc | caa | gat | att | ttg | tcc | ctt | atg | ggc | cag | atg | 882 | |
| Ala | Gln | Pro | Gln | Gly | Gly | Gln | Asp | Ile | Leu | Ser | Leu | Met | Gly | Gln | Met | | |
| | | 250 | | | | | 255 | | | | | 260 | | | | | |
| atg | aaa | cca | cga | aag | act | gaa | atc | acc | gaa | aaa | cta | cgc | caa | gaa | att | 930 | |
| Met | Lys | Pro | Arg | Lys | Thr | Glu | Ile | Thr | Glu | Lys | Leu | Arg | Gln | Glu | Ile | | |
| | 265 | | | | | 270 | | | | | 275 | | | | | | |
| aat | aag | gtg | gta | aat | aga | tat | atc | gat | gaa | gga | att | gca | gag | ctt | gta | 978 | |
| Asn | Lys | Val | Val | Asn | Arg | Tyr | Ile | Asp | Glu | Gly | Ile | Ala | Glu | Leu | Val | | |
| 280 | | | | | 285 | | | | | 290 | | | | | 295 | | |
| cct | ggt | gtt | ttg | ttc | att | gat | gag | gtc | cac | atg | ttg | gat | atc | gaa | tgt | 1026 | |
| Pro | Gly | Val | Leu | Phe | Ile | Asp | Glu | Val | His | Met | Leu | Asp | Ile | Glu | Cys | | |
| | | | | 300 | | | | | 305 | | | | | 310 | | | |
| ttt | tct | tat | ctt | aac | cgt | gca | ttg | gag | agc | cca | tta | tca | cca | atc | gtg | 1074 | |
| Phe | Ser | Tyr | Leu | Asn | Arg | Ala | Leu | Glu | Ser | Pro | Leu | Ser | Pro | Ile | Val | | |
| | | | 315 | | | | | 320 | | | | | 325 | | | | |
| ata | ctt | gct | aca | aat | agg | gga | ata | tgt | aat | gta | aga | gga | act | gat | atg | 1122 | |
| Ile | Leu | Ala | Thr | Asn | Arg | Gly | Ile | Cys | Asn | Val | Arg | Gly | Thr | Asp | Met | | |
| | | 330 | | | | | 335 | | | | | 340 | | | | | |
| aca | agt | cca | cat | ggt | ata | ccg | gtg | gat | ctt | cta | gat | agg | ctg | gtg | att | 1170 | |
| Thr | Ser | Pro | His | Gly | Ile | Pro | Val | Asp | Leu | Leu | Asp | Arg | Leu | Val | Ile | | |
| | 345 | | | | | 350 | | | | | 355 | | | | | | |
| att | cgg | aca | gag | aca | tat | ggc | cct | act | gag | atg | ata | cag | ata | ttg | gct | 1218 | |
| Ile | Arg | Thr | Glu | Thr | Tyr | Gly | Pro | Thr | Glu | Met | Ile | Gln | Ile | Leu | Ala | | |
| 360 | | | | | 365 | | | | | 370 | | | | | 375 | | |
| atc | cga | gca | caa | gtg | gag | gag | att | gat | atg | gat | gaa | gaa | agt | ctt | gct | 1266 | |
| Ile | Arg | Ala | Gln | Val | Glu | Glu | Ile | Asp | Met | Asp | Glu | Glu | Ser | Leu | Ala | | |
| | | | | 380 | | | | | 385 | | | | | 390 | | | |
| tat | tta | ggc | gag | atc | gga | cag | cag | aca | tct | ttg | aga | cat | gct | att | caa | 1314 | |
| Tyr | Leu | Gly | Glu | Ile | Gly | Gln | Gln | Thr | Ser | Leu | Arg | His | Ala | Ile | Gln | | |
| | | | 395 | | | | | 400 | | | | | 405 | | | | |
| ttg | ata | tca | cct | gcc | agc | gtg | gtc | tca | aag | act | aat | gga | aga | gag | aaa | 1362 | |

| | | | | | | | | | | | | | | | | |
|-------------|------------|-------------|-------------|-------------|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| Leu | Ile | Ser | Pro | Ala | Ser | Val | Val | Ser | Lys | Thr | Asn | Gly | Arg | Glu | Lys | |
| | | 410 | | | | | 415 | | | | | 420 | | | | |
| atc | tgc | aag | gct | gat | ctc | gag | gaa | gtc | agt | ggg | ctc | tat | ttg | gat | gcc | 1410 |
| Ile | Cys | Lys | Ala | Asp | Leu | Glu | Glu | Val | Ser | Gly | Leu | Tyr | Leu | Asp | Ala | |
| | 425 | | | | | 430 | | | | | 435 | | | | | |
| aaa | tcc | tcg | gct | cgg | ctg | ctc | cag | gag | caa | caa | gaa | aga | tac | atc | acc | 1458 |
| Lys | Ser | Ser | Ala | Arg | Leu | Leu | Gln | Glu | Gln | Gln | Glu | Arg | Tyr | Ile | Thr | |
| 440 | | | | | 445 | | | | | 450 | | | | | 455 | |
| tagattttgga | tctcctgtcg | tggaagtctc | gaagagaatg | tagttgccag | ctcgaaagtc | | | | | | | | | | | 1518 |
| atctagtgc | ttgatctgct | tcacaggttc | atagtctact | ggctcttgag | cgagcacatt | | | | | | | | | | | 1578 |
| tcgggggggaa | cggcttgaat | tttgcaagtgc | ctgcttgtgt | tagtctccar | agaagacttg | | | | | | | | | | | 1638 |
| gttccggcat | attgctcgtt | cacgcactgt | tcgctgatta | gattgggtcac | cgggtgcagga | | | | | | | | | | | 1698 |
| attgccgtgt | gtgtttttat | cttgctcatc | gggtgtccgga | gtctgcctcc | acgggttgta | | | | | | | | | | | 1758 |
| ttggcccgaa | ccctatcttt | gtaaccatgg | ataatggata | ggattcttac | agaatgcaac | | | | | | | | | | | 1818 |
| ttgcatggct | ttattatttc | taaatgtcca | taaagcataa | cgaaatgttt | ctacaacmtw | | | | | | | | | | | 1878 |
| taaaaaaaa | aaaaaaaaa | aaaaaaaaa | aaaa | | | | | | | | | | | | | 1912 |

<210> 4
 <211> 455
 <212> PRT
 <213> Zea mays

<400> 4

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
| Met | Arg | Ile | Glu | Glu | Val | Gln | Ser | Thr | Ser | Lys | Lys | Gln | Arg | Ile | Ala | |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | | |
| Thr | His | Thr | His | Ile | Lys | Gly | Leu | Gly | Leu | Asp | Ala | Asn | Gly | Met | Ala | |
| | | | 20 | | | | | 25 | | | | | 30 | | | |
| Ile | Ala | Leu | Ala | Ala | Gly | Phe | Val | Gly | Gln | Ala | Ala | Ala | Arg | Glu | Ala | |
| | | 35 | | | | | 40 | | | | | 45 | | | | |
| Ala | Gly | Leu | Ala | Val | Asp | Met | Ile | Arg | Gln | Lys | Lys | Met | Ala | Gly | Arg | |
| | 50 | | | | | 55 | | | | | 60 | | | | | |
| Ala | Val | Leu | Leu | Ala | Gly | Pro | Pro | Ala | Thr | Gly | Lys | Thr | Ala | Leu | Ala | |
| 65 | | | | | 70 | | | | | 75 | | | | | 80 | |
| Leu | Gly | Ile | Ala | Gln | Glu | Leu | Gly | Ser | Lys | Val | Pro | Phe | Cys | Pro | Met | |
| | | | | 85 | | | | | 90 | | | | | 95 | | |
| Val | Gly | Ser | Glu | Val | Tyr | Ser | Ser | Glu | Val | Lys | Lys | Thr | Glu | Val | Leu | |
| | | | 100 | | | | | 105 | | | | | 110 | | | |
| Met | Glu | Asn | Phe | Arg | Arg | Ala | Ile | Gly | Leu | Arg | Ile | Lys | Glu | Asn | Lys | |
| | | 115 | | | | | 120 | | | | | 125 | | | | |
| Glu | Val | Tyr | Glu | Gly | Glu | Val | Thr | Glu | Leu | Ser | Pro | Glu | Glu | Ala | Glu | |
| | 130 | | | | | 135 | | | | | 140 | | | | | |
| Ser | Thr | Thr | Gly | Gly | Tyr | Ala | Lys | Ser | Ile | Ser | His | Val | Ile | Ile | Ser | |
| 145 | | | | | 150 | | | | | 155 | | | | | 160 | |
| Leu | Lys | Thr | Val | Lys | Gly | Thr | Lys | Gln | Leu | Lys | Leu | Asp | Ser | Ser | Ile | |
| | | | | 165 | | | | 170 | | | | | | 175 | | |
| Tyr | Asp | Ala | Leu | Ile | Lys | Glu | Lys | Val | Ala | Val | Gly | Asp | Val | Ile | Tyr | |
| | | | 180 | | | | | 185 | | | | | 190 | | | |
| Ile | Glu | Ala | Asn | Ser | Gly | Ala | Val | Lys | Arg | Val | Gly | Arg | Cys | Asp | Ser | |
| | | 195 | | | | | 200 | | | | | 205 | | | | |
| Phe | Ala | Thr | Glu | Tyr | Asp | Leu | Glu | Ala | Glu | Glu | Tyr | Val | Pro | Ile | Pro | |
| | 210 | | | | | 215 | | | | | 220 | | | | | |
| Lys | Gly | Glu | Val | His | Lys | Lys | Lys | Glu | Ile | Val | Gln | Asp | Val | Thr | Leu | |
| 225 | | | | | 230 | | | | | 235 | | | | | 240 | |

His Asp Leu Asp Ala Ala Asn Ala Gln Pro Gln Gly Gly Gln Asp Ile
 245 250 255
 Leu Ser Leu Met Gly Gln Met Met Lys Pro Arg Lys Thr Glu Ile Thr
 260 265 270
 Glu Lys Leu Arg Gln Glu Ile Asn Lys Val Val Asn Arg Tyr Ile Asp
 275 280 285
 Glu Gly Ile Ala Glu Leu Val Pro Gly Val Leu Phe Ile Asp Glu Val
 290 295 300
 His Met Leu Asp Ile Glu Cys Phe Ser Tyr Leu Asn Arg Ala Leu Glu
 305 310 315 320
 Ser Pro Leu Ser Pro Ile Val Ile Leu Ala Thr Asn Arg Gly Ile Cys
 325 330 335
 Asn Val Arg Gly Thr Asp Met Thr Ser Pro His Gly Ile Pro Val Asp
 340 345 350
 Leu Leu Asp Arg Leu Val Ile Ile Arg Thr Glu Thr Tyr Gly Pro Thr
 355 360 365
 Glu Met Ile Gln Ile Leu Ala Ile Arg Ala Gln Val Glu Glu Ile Asp
 370 375 380
 Met Asp Glu Glu Ser Leu Ala Tyr Leu Gly Glu Ile Gly Gln Gln Thr
 385 390 395 400
 Ser Leu Arg His Ala Ile Gln Leu Ile Ser Pro Ala Ser Val Val Ser
 405 410 415
 Lys Thr Asn Gly Arg Glu Lys Ile Cys Lys Ala Asp Leu Glu Glu Val
 420 425 430
 Ser Gly Leu Tyr Leu Asp Ala Lys Ser Ser Ala Arg Leu Leu Gln Glu
 435 440 445
 Gln Gln Glu Arg Tyr Ile Thr
 450 455

<210> 5
 <211> 1886
 <212> DNA
 <213> Zea mays

<220>
 <221> CDS
 <222> (82)...(1446)

<400> 5
 tcgacccacg cgtccggcgg cggccggcgg gagagagcag ctctagagag aacagagagc 60
 gcataactag cggcggcggc g atg agg ata gag gag gtg caa tcg acc tcg 111
 Met Arg Ile Glu Glu Val Gln Ser Thr Ser
 1 5 10
 aag aag cag cgc atc gcc acc cac act cac atc aag ggc ctc ggc ctc 159
 Lys Lys Gln Arg Ile Ala Thr His Thr His Ile Lys Gly Leu Gly Leu 25
 15 20
 gac gcc aat gga atg tcg atg ccg ttg gcg gcg ggg ttc gtg ggc cag 207
 Asp Ala Asn Gly Met Ser Met Pro Leu Ala Ala Gly Phe Val Gly Gln 40
 30 35 40
 gcg gcg gcg cgc gag gcg gcc ggg ctg gcg gtc gac atg atc cgc cag 255
 Ala Ala Ala Arg Glu Ala Ala Gly Leu Ala Val Asp Met Ile Arg Gln 55
 45 50 55

| | |
|---|-----|
| aag aag atg gcc ggt cgc gcg ctg ctc ctt gcg ggc ccg ccc gcc acg Lys Lys Met Ala Gly Arg Ala Leu Leu Leu Ala Gly Pro Pro Ala Thr 60 65 70 | 303 |
| ggc aaa acg gcg cta gcg ctc ggc ata gcg cag gag ctc ggc agc aag Gly Lys Thr Ala Leu Ala Leu Gly Ile Ala Gln Glu Leu Gly Ser Lys 75 80 85 90 | 351 |
| gtc cca ttc tgt cct atg gta gga tca gaa gtg tac tcc tca gag gtc Val Pro Phe Cys Pro Met Val Gly Ser Glu Val Tyr Ser Ser Glu Val 95 100 105 | 399 |
| aag aaa act gag gtg ctg atg gaa aat ttc cgt aga gct ata ggt ttg Lys Lys Thr Glu Val Leu Met Glu Asn Phe Arg Arg Ala Ile Gly Leu 110 115 120 | 447 |
| cgt ata aag gaa aac aaa gag gtt tat gaa gga gag gtt att gaa ctt Arg Ile Lys Glu Asn Lys Glu Val Tyr Glu Gly Glu Val Ile Glu Leu 125 130 135 | 495 |
| tcc cca gaa gag gct gag agc aca act ggt gga tat gcg aaa agc att Ser Pro Glu Glu Ala Glu Ser Thr Thr Gly Gly Tyr Ala Lys Ser Ile 140 145 150 | 543 |
| agc cac gta atc att ggc tta aag act gtc aaa ggg act aag caa ttg Ser His Val Ile Ile Gly Leu Lys Thr Val Lys Gly Thr Lys Gln Leu 155 160 165 170 | 591 |
| aaa tta gac cct tca att tat gat gct ttg atc aag gaa aag gtg gca Lys Leu Asp Pro Ser Ile Tyr Asp Ala Leu Ile Lys Glu Lys Val Ala 175 180 185 | 639 |
| gtg ggt gat gtt ata tac att gaa gca aat agt gga gca gtg aaa aga Val Gly Asp Val Ile Tyr Ile Glu Ala Asn Ser Gly Ala Val Lys Arg 190 195 200 | 687 |
| gtt ggt aga tgt gat tct ttt gct aca gaa tat gat ctt gaa gct gaa Val Gly Arg Cys Asp Ser Phe Ala Thr Glu Tyr Asp Leu Glu Ala Glu 205 210 215 | 735 |
| gag tat gtt cct atc ccc aaa ggt gaa gtc cat aag aaa aag gaa ata Glu Tyr Val Pro Ile Pro Lys Gly Glu Val His Lys Lys Lys Glu Ile 220 225 230 | 783 |
| gtg cag gat gtc aca ctc cat gac ctt gat gca gca aat gcc cag cca Val Gln Asp Val Thr Leu His Asp Leu Asp Ala Ala Asn Ala Gln Pro 235 240 245 250 | 831 |
| caa ggt ggc caa gat att ttg tcc ctt atg ggc cag atg atg aag cca Gln Gly Gly Gln Asp Ile Leu Ser Leu Met Gly Gln Met Met Lys Pro 255 260 265 | 879 |
| cgg aag act gaa atc acc gaa aag cta cgc caa gaa atc aat aag gtg Arg Lys Thr Glu Ile Thr Glu Lys Leu Arg Gln Glu Ile Asn Lys Val 270 275 280 | 927 |

| | |
|---|------|
| gta aac aga tat atc gac gaa gga atc gca gag ctt gta cct ggt gtt Val Asn Arg Tyr Ile Asp Glu Gly Ile Ala Glu Leu Val Pro Gly Val 285 290 295 | 975 |
| ttg ttc att gat gag gtc cac atg ttg gat att gaa tgc ttt tct tat Leu Phe Ile Asp Glu Val His Met Leu Asp Ile Glu Cys Phe Ser Tyr 300 305 310 | 1023 |
| ctt aac cgt gca ttg gag agc cca tta tca cca att gtg ata ctc gct Leu Asn Arg Ala Leu Glu Ser Pro Leu Ser Pro Ile Val Ile Leu Ala 315 320 325 330 | 1071 |
| acg aat aga gga ata tgt aat gtg aga gga acc gat atg acg agt cca Thr Asn Arg Gly Ile Cys Asn Val Arg Gly Thr Asp Met Thr Ser Pro 335 340 345 | 1119 |
| cat ggt ata cca gtg gac ctt cta gat agg ttg gtg att att cgg aca His Gly Ile Pro Val Asp Leu Leu Asp Arg Leu Val Ile Ile Arg Thr 350 355 360 | 1167 |
| gaa aca tat ggc cct act gag atg ata cag ata ctg gct atc cga gca Glu Thr Tyr Gly Pro Thr Glu Met Ile Gln Ile Leu Ala Ile Arg Ala 365 370 375 | 1215 |
| caa gtg gaa gag att gat atc gat gaa gaa agt ctt gct tat tta ggc Gln Val Glu Glu Ile Asp Ile Asp Glu Glu Ser Leu Ala Tyr Leu Gly 380 385 390 | 1263 |
| gag atc gga cag cag aca tct ttg aga cat gct att cag ttg cta tca Glu Ile Gly Gln Gln Thr Ser Leu Arg His Ala Ile Gln Leu Leu Ser 395 400 405 410 | 1311 |
| cct gcc agc gtg gtc gca aag acc aac ggg aga gaa aag atg tgc aag Pro Ala Ser Val Val Ala Lys Thr Asn Gly Arg Glu Lys Met Cys Lys 415 420 425 | 1359 |
| gct gac ctc gag gaa gtc agc ggg ctc tat ttg gat gcc aaa tcc tcg Ala Asp Leu Glu Glu Val Ser Gly Leu Tyr Leu Asp Ala Lys Ser Ser 430 435 440 | 1407 |
| gct cgc ctg ctc cag gag caa caa gaa aga tac atc acc tagacttgca Ala Arg Leu Leu Gln Glu Gln Gln Glu Arg Tyr Ile Thr 445 450 455 | 1456 |
| tctcctgctg tggaaggaaa agcctcgaag agaaatgcat tctgcaaagt gcgtcgatct | 1516 |
| gcttcagtat gtcgtagtct acaagtcttg gagagagcac gtttctgcgg ggaaggaaaa | 1576 |
| ctgtttgaat tttgtagtac ctgttttttg ttagcctcca gcgaagactt gattccggca | 1636 |
| tggttgcttgt tcacgcaccg ttaacaccga ttaagattgg cccagccgtg caggaattgc | 1696 |
| cgggtgtgtt ttcacccct cgctaatacga tgtccagaat ctgtgtgccc acgggtgttg | 1756 |
| tattgaccct agctttgtaa ccatgcacat gatttctttt ttaacgctga tggatggcac | 1816 |
| ctggatctct gtccatggcc atcgtaatcc cactgtctgg agcagggttt catgaaaaaa | 1876 |
| aaaaaaaaaa | 1886 |
| <210> 6 | |
| <211> 455 | |
| <212> PRT | |

<213> Zea mays

<400> 6

| | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Arg | Ile | Glu | Glu | Val | Gln | Ser | Thr | Ser | Lys | Lys | Gln | Arg | Ile | Ala | 1 | 5 | 10 | 15 |
| Thr | His | Thr | His | Ile | Lys | Gly | Leu | Gly | Leu | Asp | Ala | Asn | Gly | Met | Ser | 20 | 25 | 30 | |
| Met | Pro | Leu | Ala | Ala | Gly | Phe | Val | Gly | Gln | Ala | Ala | Ala | Arg | Glu | Ala | 35 | 40 | 45 | |
| Ala | Gly | Leu | Ala | Val | Asp | Met | Ile | Arg | Gln | Lys | Lys | Met | Ala | Gly | Arg | 50 | 55 | 60 | |
| Ala | Leu | Leu | Leu | Ala | Gly | Pro | Pro | Ala | Thr | Gly | Lys | Thr | Ala | Leu | Ala | 65 | 70 | 75 | 80 |
| Leu | Gly | Ile | Ala | Gln | Glu | Leu | Gly | Ser | Lys | Val | Pro | Phe | Cys | Pro | Met | 85 | 90 | 95 | |
| Val | Gly | Ser | Glu | Val | Tyr | Ser | Ser | Glu | Val | Lys | Lys | Thr | Glu | Val | Leu | 100 | 105 | 110 | |
| Met | Glu | Asn | Phe | Arg | Arg | Ala | Ile | Gly | Leu | Arg | Ile | Lys | Glu | Asn | Lys | 115 | 120 | 125 | |
| Glu | Val | Tyr | Glu | Gly | Glu | Val | Ile | Glu | Leu | Ser | Pro | Glu | Glu | Ala | Glu | 130 | 135 | 140 | |
| Ser | Thr | Thr | Gly | Gly | Tyr | Ala | Lys | Ser | Ile | Ser | His | Val | Ile | Ile | Gly | 145 | 150 | 155 | 160 |
| Leu | Lys | Thr | Val | Lys | Gly | Thr | Lys | Gln | Leu | Lys | Leu | Asp | Pro | Ser | Ile | 165 | 170 | 175 | |
| Tyr | Asp | Ala | Leu | Ile | Lys | Glu | Lys | Val | Ala | Val | Gly | Asp | Val | Ile | Tyr | 180 | 185 | 190 | |
| Ile | Glu | Ala | Asn | Ser | Gly | Ala | Val | Lys | Arg | Val | Gly | Arg | Cys | Asp | Ser | 195 | 200 | 205 | |
| Phe | Ala | Thr | Glu | Tyr | Asp | Leu | Glu | Ala | Glu | Glu | Tyr | Val | Pro | Ile | Pro | 210 | 215 | 220 | |
| Lys | Gly | Glu | Val | His | Lys | Lys | Lys | Glu | Ile | Val | Gln | Asp | Val | Thr | Leu | 225 | 230 | 235 | 240 |
| His | Asp | Leu | Asp | Ala | Ala | Asn | Ala | Gln | Pro | Gln | Gly | Gly | Gln | Asp | Ile | 245 | 250 | 255 | |
| Leu | Ser | Leu | Met | Gly | Gln | Met | Met | Lys | Pro | Arg | Lys | Thr | Glu | Ile | Thr | 260 | 265 | 270 | |
| Glu | Lys | Leu | Arg | Gln | Glu | Ile | Asn | Lys | Val | Val | Asn | Arg | Tyr | Ile | Asp | 275 | 280 | 285 | |
| Glu | Gly | Ile | Ala | Glu | Leu | Val | Pro | Gly | Val | Leu | Phe | Ile | Asp | Glu | Val | 290 | 295 | 300 | |
| His | Met | Leu | Asp | Ile | Glu | Cys | Phe | Ser | Tyr | Leu | Asn | Arg | Ala | Leu | Glu | 305 | 310 | 315 | 320 |
| Ser | Pro | Leu | Ser | Pro | Ile | Val | Ile | Leu | Ala | Thr | Asn | Arg | Gly | Ile | Cys | 325 | 330 | 335 | |
| Asn | Val | Arg | Gly | Thr | Asp | Met | Thr | Ser | Pro | His | Gly | Ile | Pro | Val | Asp | 340 | 345 | 350 | |
| Leu | Leu | Asp | Arg | Leu | Val | Ile | Ile | Arg | Thr | Glu | Thr | Tyr | Gly | Pro | Thr | 355 | 360 | 365 | |
| Glu | Met | Ile | Gln | Ile | Leu | Ala | Ile | Arg | Ala | Gln | Val | Glu | Glu | Ile | Asp | 370 | 375 | 380 | |
| Ile | Asp | Glu | Glu | Ser | Leu | Ala | Tyr | Leu | Gly | Glu | Ile | Gly | Gln | Gln | Thr | 385 | 390 | 395 | 400 |
| Ser | Leu | Arg | His | Ala | Ile | Gln | Leu | Leu | Ser | Pro | Ala | Ser | Val | Val | Ala | 405 | 410 | 415 | |
| Lys | Thr | Asn | Gly | Arg | Glu | Lys | Met | Cys | Lys | Ala | Asp | Leu | Glu | Glu | Val | | | | |

| 135 | 140 | 145 | |
|---|-----|-----|------|
| ggt gga tat gcg aaa agc att agc cac gta atc att ggc tta aag act Gly Gly Tyr Ala Lys Ser Ile Ser His Val Ile Ile Gly Leu Lys Thr 150 155 160 | | | 657 |
| gtc aaa ggg act aag caa ttg aaa tta gac cct tca att tat gat gct Val Lys Gly Thr Lys Gln Leu Lys Leu Asp Pro Ser Ile Tyr Asp Ala 165 170 175 180 | | | 705 |
| ttg atc aag gaa aag gtg gca gtg ggt gat gtt ata tac att gaa gca Leu Ile Lys Glu Lys Val Ala Val Gly Asp Val Ile Tyr Ile Glu Ala 185 190 195 | | | 753 |
| aat agt gga gca gtg aaa aga gtt ggt aga tgt gat tct ttt gct aca Asn Ser Gly Ala Val Lys Arg Val Gly Arg Cys Asp Ser Phe Ala Thr 200 205 210 | | | 801 |
| gaa tat gat ctt gaa gct gaa gag tat gtt cct atc ccc aaa ggt gaa Glu Tyr Asp Leu Glu Ala Glu Glu Tyr Val Pro Ile Pro Lys Gly Glu 215 220 225 | | | 849 |
| gtc cat aag aaa aag gaa ata gtg cag gat gtc aca ctc cat gac ctt Val His Lys Lys Lys Glu Ile Val Gln Asp Val Thr Leu His Asp Leu 230 235 240 | | | 897 |
| gat gca gca aat gcc cag cca caa ggt ggc caa gat att ttg tcc ctt Asp Ala Ala Asn Ala Gln Pro Gln Gly Gly Gln Asp Ile Leu Ser Leu 245 250 255 260 | | | 945 |
| atg ggc cag atg atg aag cca cgg aag act gaa atc acc gaa aag cta Met Gly Gln Met Met Lys Pro Arg Lys Thr Glu Ile Thr Glu Lys Leu 265 270 275 | | | 993 |
| cgc caa gaa atc aat aag gtg gta aac aga tat atc gac gaa gga atc Arg Gln Glu Ile Asn Lys Val Val Asn Arg Tyr Ile Asp Glu Gly Ile 280 285 290 | | | 1041 |
| gca gag ctt gta cct ggt gtt ttg ttc att gat gag gtc cac atg ttg Ala Glu Leu Val Pro Gly Val Leu Phe Ile Asp Glu Val His Met Leu 295 300 305 | | | 1089 |
| gat att gaa tgc ttt tct tat ctt aac cgt gca ttg gag agc cca tta Asp Ile Glu Cys Phe Ser Tyr Leu Asn Arg Ala Leu Glu Ser Pro Leu 310 315 320 | | | 1137 |
| tca cca att gtg ata ctc gct acg aat aga gga ata tgt aat gtg aga Ser Pro Ile Val Ile Leu Ala Thr Asn Arg Gly Ile Cys Asn Val Arg 325 330 335 340 | | | 1185 |
| gga acc gat atg acg agt cca cat ggt ata cca gtg gac ctt cta gat Gly Thr Asp Met Thr Ser Pro His Gly Ile Pro Val Asp Leu Leu Asp 345 350 355 | | | 1233 |
| agg ttg gtg att att cgg aca gaa aca tat ggc cct act gag atg ata Arg Leu Val Ile Ile Arg Thr Glu Thr Tyr Gly Pro Thr Glu Met Ile | | | 1281 |

| 360 | 365 | 370 | |
|---|-----|-----|------|
| cag ata ctg gct atc cga gca caa gtg gaa gag att gat atc gat gaa | | | 1329 |
| Gln Ile Leu Ala Ile Arg Ala Gln Val Glu Glu Ile Asp Ile Asp Glu | | | |
| 375 | 380 | 385 | |
| gaa agt ctt gct tat tta ggc gag atc gga cag cag aca tct ttg aga | | | 1377 |
| Glu Ser Leu Ala Tyr Leu Gly Glu Ile Gly Gln Gln Thr Ser Leu Arg | | | |
| 390 | 395 | 400 | |
| cat gct att cag ttg cta tca cct gcc agc gtg gtc gca aag acc aac | | | 1425 |
| His Ala Ile Gln Leu Leu Ser Pro Ala Ser Val Val Ala Lys Thr Asn | | | |
| 405 | 410 | 415 | 420 |
| ggg aga gaa aag atg tgc aag gct gac ctc gag gaa gtc agc ggg ctc | | | 1473 |
| Gly Arg Glu Lys Met Cys Lys Ala Asp Leu Glu Glu Val Ser Gly Leu | | | |
| 425 | 430 | 435 | |
| tat ttg gat gcc aaa tcc tcg gct cgc ctg ctc cag gag caa caa gaa | | | 1521 |
| Tyr Leu Asp Ala Lys Ser Ser Ala Arg Leu Leu Gln Glu Gln Gln Glu | | | |
| 440 | 445 | 450 | |
| aga tac atc acc tagacttgca tctcctgctg tggaaggaaa agcctcgaag | | | 1573 |
| Arg Tyr Ile Thr | | | |
| 455 | | | |
| agaaatgcat tctgcaaagt gcgtcgatct gcttcagtat gtcgtagtct acaagtcttg | | | 1633 |
| gagagagcac gtttctgcgg ggaaggaaaa ctgtttgaat tttgtagtac ctgttttttg | | | 1693 |
| ttagcctcca gcgaagactt gattccggca tattgcttgt tcacgcaccg ttaacaccga | | | 1753 |
| ttaagattgg ccagccgtg caggaattgc cgggtgtgtt ttcaccccct cgctaatcga | | | 1813 |
| tgtccagaat ctgtgtgccc acgggtgttg tattgaccct agctttgtaa ccatgcacat | | | 1873 |
| gatttcttta aaaaaaaaaa aaaaa | | | 1898 |
| <210> 8 | | | |
| <211> 456 | | | |
| <212> PRT | | | |
| <213> Zea mays | | | |
| <400> 8 | | | |
| Met Arg Ile Glu Glu Val Gln Ser Thr Ser Lys Lys Gln Arg Ile Ala | | | |
| 1 5 10 15 | | | |
| Thr His Thr His Ile Lys Gly Leu Gly Leu Asp Gln Ala Asn Gly Met | | | |
| 20 25 30 | | | |
| Ser Met Pro Leu Ala Ala Gly Phe Val Gly Gln Ala Ala Ala Arg Glu | | | |
| 35 40 45 | | | |
| Ala Ala Gly Leu Ala Val Asp Met Ile Arg Gln Lys Lys Met Ala Gly | | | |
| 50 55 60 | | | |
| Arg Ala Leu Leu Leu Ala Gly Pro Pro Ala Thr Gly Lys Thr Ala Leu | | | |
| 65 70 75 80 | | | |
| Ala Leu Gly Ile Ala Gln Glu Leu Gly Ser Lys Val Pro Phe Cys Pro | | | |
| 85 90 95 | | | |
| Met Val Gly Ser Glu Val Tyr Ser Ser Glu Val Lys Lys Thr Glu Val | | | |
| 100 105 110 | | | |
| Leu Met Glu Asn Phe Arg Arg Ala Ile Gly Leu Arg Ile Lys Glu Asn | | | |
| 115 120 125 | | | |
| Lys Glu Val Tyr Glu Gly Glu Val Ile Glu Leu Ser Pro Glu Glu Ala | | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 130 | | | | | | 135 | | | | | 140 | | | | | |
| Glu | Ser | Thr | Thr | Gly | Gly | Tyr | Ala | Lys | Ser | Ile | Ser | His | Val | Ile | Ile | |
| 145 | | | | | 150 | | | | | 155 | | | | | | 160 |
| Gly | Leu | Lys | Thr | Val | Lys | Gly | Thr | Lys | Gln | Leu | Lys | Leu | Asp | Pro | Ser | |
| | | | | 165 | | | | | 170 | | | | | 175 | | |
| Ile | Tyr | Asp | Ala | Leu | Ile | Lys | Glu | Lys | Val | Ala | Val | Gly | Asp | Val | Ile | |
| | | | 180 | | | | | 185 | | | | | 190 | | | |
| Tyr | Ile | Glu | Ala | Asn | Ser | Gly | Ala | Val | Lys | Arg | Val | Gly | Arg | Cys | Asp | |
| | | 195 | | | | | 200 | | | | | 205 | | | | |
| Ser | Phe | Ala | Thr | Glu | Tyr | Asp | Leu | Glu | Ala | Glu | Glu | Tyr | Val | Pro | Ile | |
| | 210 | | | | | 215 | | | | | 220 | | | | | |
| Pro | Lys | Gly | Glu | Val | His | Lys | Lys | Lys | Glu | Ile | Val | Gln | Asp | Val | Thr | |
| 225 | | | | | 230 | | | | | 235 | | | | | 240 | |
| Leu | His | Asp | Leu | Asp | Ala | Ala | Asn | Ala | Gln | Pro | Gln | Gly | Gly | Gln | Asp | |
| | | | 245 | | | | | | 250 | | | | | 255 | | |
| Ile | Leu | Ser | Leu | Met | Gly | Gln | Met | Met | Lys | Pro | Arg | Lys | Thr | Glu | Ile | |
| | | 260 | | | | | | 265 | | | | | 270 | | | |
| Thr | Glu | Lys | Leu | Arg | Gln | Glu | Ile | Asn | Lys | Val | Val | Asn | Arg | Tyr | Ile | |
| | | 275 | | | | | 280 | | | | | 285 | | | | |
| Asp | Glu | Gly | Ile | Ala | Glu | Leu | Val | Pro | Gly | Val | Leu | Phe | Ile | Asp | Glu | |
| | 290 | | | | | 295 | | | | | 300 | | | | | |
| Val | His | Met | Leu | Asp | Ile | Glu | Cys | Phe | Ser | Tyr | Leu | Asn | Arg | Ala | Leu | |
| 305 | | | | | 310 | | | | | 315 | | | | | 320 | |
| Glu | Ser | Pro | Leu | Ser | Pro | Ile | Val | Ile | Leu | Ala | Thr | Asn | Arg | Gly | Ile | |
| | | | 325 | | | | | | 330 | | | | | 335 | | |
| Cys | Asn | Val | Arg | Gly | Thr | Asp | Met | Thr | Ser | Pro | His | Gly | Ile | Pro | Val | |
| | | 340 | | | | | 345 | | | | | 350 | | | | |
| Asp | Leu | Leu | Asp | Arg | Leu | Val | Ile | Ile | Arg | Thr | Glu | Thr | Tyr | Gly | Pro | |
| | 355 | | | | | | 360 | | | | | 365 | | | | |
| Thr | Glu | Met | Ile | Gln | Ile | Leu | Ala | Ile | Arg | Ala | Gln | Val | Glu | Glu | Ile | |
| | 370 | | | | | 375 | | | | | 380 | | | | | |
| Asp | Ile | Asp | Glu | Glu | Ser | Leu | Ala | Tyr | Leu | Gly | Glu | Ile | Gly | Gln | Gln | |
| 385 | | | | | 390 | | | | | 395 | | | | | 400 | |
| Thr | Ser | Leu | Arg | His | Ala | Ile | Gln | Leu | Leu | Ser | Pro | Ala | Ser | Val | Val | |
| | | | 405 | | | | | | 410 | | | | | 415 | | |
| Ala | Lys | Thr | Asn | Gly | Arg | Glu | Lys | Met | Cys | Lys | Ala | Asp | Leu | Glu | Glu | |
| | | 420 | | | | | | 425 | | | | | 430 | | | |
| Val | Ser | Gly | Leu | Tyr | Leu | Asp | Ala | Lys | Ser | Ser | Ala | Arg | Leu | Leu | Gln | |
| | 435 | | | | | 440 | | | | | 445 | | | | | |
| Glu | Gln | Gln | Glu | Arg | Tyr | Ile | Thr | | | | | | | | | |
| 450 | | | | | | 455 | | | | | | | | | | |

<210> 9

<211> 1869

<212> DNA

<213> Zea mays

<220>

<221> CDS

<222> (64)...(1377)

<400> 9

cgaccacgc gtccgggcag ctccacagaa acagagagcg cataaccggc ggcgttggcg

gcg atg agg atc gag gag gtg cag tcg acc tcg aag aag cag cgc atc

Met Arg Ile Glu Glu Val Gln Ser Thr Ser Lys Lys Gln Arg Ile

1

5

10

15

60

108

| | |
|---|-----|
| gcc acc cac acc cac atc aag gga ctc ggc ctc gac gcc aat ggg atg Ala Thr His Thr His Ile Lys Gly Leu Gly Leu Asp Ala Asn Gly Met 20 25 30 | 156 |
| gcg att gcg ttg gcg gcg ggg ttc gtg ggc cag aag aag atg gcc ggc Ala Ile Ala Leu Ala Ala Gly Phe Val Gly Gln Lys Lys Met Ala Gly 35 40 45 | 204 |
| cgc gcg gtg ctc ctt gcg ggt ccg ccc gcc acg ggc aag acg gcg cta Arg Ala Val Leu Leu Ala Gly Pro Pro Ala Thr Gly Lys Thr Ala Leu 50 55 60 | 252 |
| gcg ggc ata gcc cag gag ctc ggc agc aag gtc cct ttc tgt cct atg Ala Gly Ile Ala Gln Glu Leu Gly Ser Lys Val Pro Phe Cys Pro Met 65 70 75 | 300 |
| gta gga tca gaa gtg tac tcc tcg gag gtc aag aaa act gag gtg ctg Val Gly Ser Glu Val Tyr Ser Ser Glu Val Lys Lys Thr Glu Val Leu 80 85 90 95 | 348 |
| atg gaa aat ttc cgt aga gct ata ggt ttg cgt ata aag gaa aac aaa Met Glu Asn Phe Arg Arg Ala Ile Gly Leu Arg Ile Lys Glu Asn Lys 100 105 110 | 396 |
| gag gtt tat gaa gga gag gtt act gaa ctt tcc cca gaa gag gct gag Glu Val Tyr Glu Gly Glu Val Thr Glu Leu Ser Pro Glu Glu Ala Glu 115 120 125 | 444 |
| agt aca act ggt gga tat gca aaa agc att agc cat gta atc atc agc Ser Thr Thr Gly Gly Tyr Ala Lys Ser Ile Ser His Val Ile Ile Ser 130 135 140 | 492 |
| tta aag act gtt aaa ggg act aag caa ctg aag tta gat tct tca att Leu Lys Thr Val Lys Gly Thr Lys Gln Leu Lys Leu Asp Ser Ser Ile 145 150 155 | 540 |
| tat gat gct ctg atc aag gaa aag gtg gca gtg ggt gat gtt ata tac Tyr Asp Ala Leu Ile Lys Glu Lys Val Ala Val Gly Asp Val Ile Tyr 160 165 170 175 | 588 |
| atc gaa gca aat agt gga gca gtg aaa aga gtt ggt aga tgt gat tct Ile Glu Ala Asn Ser Gly Ala Val Lys Arg Val Gly Arg Cys Asp Ser 180 185 190 | 636 |
| ttt gct aca gaa tac gat ctt gaa gct gaa gag tat gtt cct atc ccc Phe Ala Thr Glu Tyr Asp Leu Glu Ala Glu Glu Tyr Val Pro Ile Pro 195 200 205 | 684 |
| aaa ggt gaa gtc cat aag aaa aaa gaa att gtg cag gat gtc aca ctt Lys Gly Glu Val His Lys Lys Lys Glu Ile Val Gln Asp Val Thr Leu 210 215 220 | 732 |
| cat gac ctt gat gca gca aat gct cag cca caa ggt ggc caa gat att His Asp Leu Asp Ala Ala Asn Ala Gln Pro Gln Gly Gly Gln Asp Ile 225 230 235 | 780 |

| | |
|---|------|
| ttg tcc ctt atg ggc cag atg atg aaa cca cga aag act gaa atc acc | 828 |
| Leu Ser Leu Met Gly Gln Met Met Lys Pro Arg Lys Thr Glu Ile Thr | |
| 240 245 250 255 | |
| gaa aaa cta cgc caa gaa att aat aag gtg gta aat aga tat atc gat | 876 |
| Glu Lys Leu Arg Gln Glu Ile Asn Lys Val Val Asn Arg Tyr Ile Asp | |
| 260 265 270 | |
| gaa gga att gca gag ctt gta cct ggt gtt ttg ttc att gat gag gtc | 924 |
| Glu Gly Ile Ala Glu Leu Val Pro Gly Val Leu Phe Ile Asp Glu Val | |
| 275 280 285 | |
| cac atg ttg gat atc gaa tgt ttt tct tat ctt aac cgt gca ttg gag | 972 |
| His Met Leu Asp Ile Glu Cys Phe Ser Tyr Leu Asn Arg Ala Leu Glu | |
| 290 295 300 | |
| agc cca tta tca cca atc gtg ata ctt gct aca aat agg gga ata tgt | 1020 |
| Ser Pro Leu Ser Pro Ile Val Ile Leu Ala Thr Asn Arg Gly Ile Cys | |
| 305 310 315 | |
| aat gta aga gga act gat atg aca agt cca cat ggt ata ccg gtg gat | 1068 |
| Asn Val Arg Gly Thr Asp Met Thr Ser Pro His Gly Ile Pro Val Asp | |
| 320 325 330 335 | |
| ctt cta gat agg ctg gtg att att cgg aca gag aca tat ggc cct act | 1116 |
| Leu Leu Asp Arg Leu Val Ile Ile Arg Thr Glu Thr Tyr Gly Pro Thr | |
| 340 345 350 | |
| gag atg ata cag ata ttg gct atc cga gca caa gtg gag gag att gat | 1164 |
| Glu Met Ile Gln Ile Leu Ala Ile Arg Ala Gln Val Glu Glu Ile Asp | |
| 355 360 365 | |
| atg gat gaa gaa agt ctt gct tat tta ggc gag atc gga cag cag aca | 1212 |
| Met Asp Glu Glu Ser Leu Ala Tyr Leu Gly Glu Ile Gly Gln Gln Thr | |
| 370 375 380 | |
| tct ttg aga cat gct att caa ttg ata tca cct gcc agc gtg gtc tca | 1260 |
| Ser Leu Arg His Ala Ile Gln Leu Ile Ser Pro Ala Ser Val Val Ser | |
| 385 390 395 | |
| aag act aat gga aga gag aaa atc tgc aag gct gat ctc gag gaa gtt | 1308 |
| Lys Thr Asn Gly Arg Glu Lys Ile Cys Lys Ala Asp Leu Glu Glu Val | |
| 400 405 410 415 | |
| agt ggg ctc tat ttg gat gcc aaa tcc tcg gct cgg ctg ctc cag gag | 1356 |
| Ser Gly Leu Tyr Leu Asp Ala Lys Ser Ser Ala Arg Leu Leu Gln Glu | |
| 420 425 430 | |
| caa caa gaa aga tac atc acc tagatttggg tcacctgtcg tggaagtctc | 1407 |
| Gln Gln Glu Arg Tyr Ile Thr | |
| 435 | |
| gaagagaatg tagttgccag ctcgaaagtc atctagtgaa ttgatctgct tcacaggtct | 1467 |
| tggagcgagc acatttcggg ggggacggct tgaattttgc agtgcctgct tgtgtagtc | 1527 |
| tccagagaag acttggtacc ggcatattgc ctgttcacgc actgttcgct gattagattg | 1587 |

```

gtcaccggtg caggaattgc cgtgtgtgtt ttttatcttg ctcacggtg tccggaatct 1647
gtgcctccac gggttgtatt ggcccgaacc ctatctttgt aaccatggat aatggatagc 1707
attcttacag aatgcaactt gcatggcttt attatttcta aatgtccata aagcttaaca 1767
aaatgtttct acaacatata gacctcctgc ccaaattaaa attcgtttta gcttagataa 1827
ttaatgggta catacactac tttatgtaaa aaaaaaaaaa aa 1869

```

<210> 10
 <211> 438
 <212> PRT
 <213> Zea mays

```

<400> 10
Met Arg Ile Glu Glu Val Gln Ser Thr Ser Lys Lys Gln Arg Ile Ala
1      5      10      15
Thr His Thr His Ile Lys Gly Leu Gly Leu Asp Ala Asn Gly Met Ala
20     25     30
Ile Ala Leu Ala Ala Gly Phe Val Gly Gln Lys Lys Met Ala Gly Arg
35     40     45
Ala Val Leu Leu Ala Gly Pro Pro Ala Thr Gly Lys Thr Ala Leu Ala
50     55     60
Gly Ile Ala Gln Glu Leu Gly Ser Lys Val Pro Phe Cys Pro Met Val
65     70     75     80
Gly Ser Glu Val Tyr Ser Ser Glu Val Lys Lys Thr Glu Val Leu Met
85     90     95
Glu Asn Phe Arg Arg Ala Ile Gly Leu Arg Ile Lys Glu Asn Lys Glu
100    105    110
Val Tyr Glu Gly Glu Val Thr Glu Leu Ser Pro Glu Glu Ala Glu Ser
115    120    125
Thr Thr Gly Gly Tyr Ala Lys Ser Ile Ser His Val Ile Ile Ser Leu
130    135    140
Lys Thr Val Lys Gly Thr Lys Gln Leu Lys Leu Asp Ser Ser Ile Tyr
145    150    155    160
Asp Ala Leu Ile Lys Glu Lys Val Ala Val Gly Asp Val Ile Tyr Ile
165    170    175
Glu Ala Asn Ser Gly Ala Val Lys Arg Val Gly Arg Cys Asp Ser Phe
180    185    190
Ala Thr Glu Tyr Asp Leu Glu Ala Glu Glu Tyr Val Pro Ile Pro Lys
195    200    205
Gly Glu Val His Lys Lys Lys Glu Ile Val Gln Asp Val Thr Leu His
210    215    220
Asp Leu Asp Ala Ala Asn Ala Gln Pro Gln Gly Gly Gln Asp Ile Leu
225    230    235    240
Ser Leu Met Gly Gln Met Met Lys Pro Arg Lys Thr Glu Ile Thr Glu
245    250    255
Lys Leu Arg Gln Glu Ile Asn Lys Val Val Asn Arg Tyr Ile Asp Glu
260    265    270
Gly Ile Ala Glu Leu Val Pro Gly Val Leu Phe Ile Asp Glu Val His
275    280    285
Met Leu Asp Ile Glu Cys Phe Ser Tyr Leu Asn Arg Ala Leu Glu Ser
290    295    300
Pro Leu Ser Pro Ile Val Ile Leu Ala Thr Asn Arg Gly Ile Cys Asn
305    310    315    320
Val Arg Gly Thr Asp Met Thr Ser Pro His Gly Ile Pro Val Asp Leu
325    330    335
Leu Asp Arg Leu Val Ile Ile Arg Thr Glu Thr Tyr Gly Pro Thr Glu
340    345    350

```

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Ile | Gln | Ile | Leu | Ala | Ile | Arg | Ala | Gln | Val | Glu | Glu | Ile | Asp | Met |
| | | 355 | | | | | 360 | | | | | 365 | | | |
| Asp | Glu | Glu | Ser | Leu | Ala | Tyr | Leu | Gly | Glu | Ile | Gly | Gln | Gln | Thr | Ser |
| | 370 | | | | | 375 | | | | | 380 | | | | |
| Leu | Arg | His | Ala | Ile | Gln | Leu | Ile | Ser | Pro | Ala | Ser | Val | Val | Ser | Lys |
| 385 | | | | | 390 | | | | | 395 | | | | | 400 |
| Thr | Asn | Gly | Arg | Glu | Lys | Ile | Cys | Lys | Ala | Asp | Leu | Glu | Glu | Val | Ser |
| | | | 405 | | | | | | 410 | | | | | 415 | |
| Gly | Leu | Tyr | Leu | Asp | Ala | Lys | Ser | Ser | Ala | Arg | Leu | Leu | Gln | Glu | Gln |
| | | | 420 | | | | | 425 | | | | | 430 | | |
| Gln | Glu | Arg | Tyr | Ile | Thr | | | | | | | | | | |
| | | 435 | | | | | | | | | | | | | |

<210> 11

<211> 36

<212> DNA

<213> Artificial Sequence

<220>

<223> Designed oligonucleotide based upon an adaptor used for cDNA library construction and poly(dT) to remove clones which have a poly(A) tail but no cDNA insert.

<400> 11

tcgacccacg cgtccgaaaa aaaaaaaaaa aaaaaa

36